

Appl. No. : 09/779,397
Filed : February 7, 2001

REMARKS

Amendment to the Specification

The Office states that the title is not descriptive and requests that it be amended. In response, Applicant has amended the title as set forth above. Entry of this Amendment is respectfully requested.

Amendment to the Claims

Applicant respectfully requests entry of the Amendment to the Claims set forth above. Claim 1 has been amended to recite the chemical precursors recited in Claim 8, which is now canceled. Claims 2-4 have been amended to clarify that the Si-containing film is deposited onto the substrate at the recited temperatures. These changes do not narrow the scope of Claims 2-4. Claims 28-31 and 51-59 have been canceled as being directed to a non-elected invention. After entry of this Amendment, Claims 1-7, 9-27, and 32-50 will be pending in this application.

Applicant reserves the right to file divisional and/or continuation applications containing claims directed to all or part of the subject matter of any claims amended, withdrawn, or canceled at any time during the prosecution of this application, and thus unclaimed subject matter is not dedicated to the public.

Election/Restriction

Applicant hereby affirms the previous telephonic election of Group I, Claims 1-27 and 32-50, without traverse. As noted above, non-elected Claims 28-31 and 51-59 have been canceled by the instant Amendment to the Claims.

Specification

The Office notes that the claims are directed solely to methods and thus objects to the title as being non-descriptive. As noted above, the title has now been amended by the instant Amendment to the Specification. Applicant respectfully submits that the amended title satisfies 37 C.F.R. §1.72.

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Information Disclosure Statement (IDS)

Applicant acknowledges receipt of initialed copies of the PTO-1449 forms submitted to the Office with the IDS submissions of April 9, 2001 (48 references); September 17, 2001 (8 references); January 11, 2002 (10 references); and November 27, 2002 (1 reference).

Claim Rejections - 35 U.S.C. § 112

Claims 1-27 and 32-50 have been rejected under 35 U.S.C. §112, second paragraph, apparently on the basis that the term "said temperature" in Claims 2-4, 13-14, 20-21, 37-38, and 48-49 lacks antecedent basis, and on the basis that the term "said first chemical precursor" in Claim 9 lacks antecedent basis. Claims 2-4 and 9 have now been amended to correct these oversights. With respect to the recitation of "said temperature" in Claims 13-14, 20-21 and 37-38, Applicant respectfully points out that these dependent claims depend from claims that recite "a temperature", thus providing antecedent basis for "said temperature," *see* Claims 10, 19, and 36. Therefore, since Claims 2-4 and 9 have been amended and Claims 10, 19, and 36 provide proper antecedent basis for the "said temperature" limitation recited in Claims 13-14, 20-21, and 37-38, respectively, Applicant respectfully requests reconsideration and withdrawal of the rejection of Claims 1-27 and 32-50 under 35 U.S.C. §112, second paragraph.

Claim Rejections - 35 U.S.C. §103(a)

Claims 1-27 and 32-50 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. 6,303,047 ("Aronowitz") or U.S. 6,258,407 ("Lee"). Applicant respectfully traverses this rejection.

Applicant understands the position of the Office to be as follows: Aronowitz discloses a method of forming a low dielectric constant carbon-containing silicon oxide dielectric material for an integrated circuit structure by CVD. Specifically, the Office cites Aronowitz for teaching using a compound which contains at least one silicon atom and one carbon atom to form a material having a dielectric constant of less than 3. The Office cites Lee for disclosing a precursor for making a low dielectric constant material by CVD using a precursor which contains at least one silicon atom and one carbon atom. The reaction temperature is 700-800°C and the substrate temperature can be -20 to 500°C. Although both references fail to teach the appropriate temperature range, the Office asserts that it would have been obvious to one having ordinary skill

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in the art to have determined the optimum value of a variable such as temperature through routine experimentation. Applicant respectfully requests clarification if this understanding of the Office's position is inaccurate.

Applicant respectfully disagrees with the position taken by the Office. However, to facilitate timely prosecution, Applicant has amended Claim 1 to recite chemical precursors that are neither taught nor suggested by Aronowitz or Lee, each alone or in combination. In addition, Applicant respectfully submits that Lee teaches away from the use of chemical precursors recited in Claim 1. The background section of Lee indicates that one would expect low thermal stability for films made using chemical precursors containing sp^3C-F and sp^3C-Si bonds, and states that such "low thermal stability would result in films which could not withstand the long periods at high temperatures necessary for integrated circuit manufacture." See Lee at column 2, lines 14-24. Thus, Lee teaches away from many of the chemical precursors recited in Claim 1 whose generic structures encompass chemical precursors containing sp^3C-F and/or sp^3C-Si bonds. For example, the following Table 1 shows various recited generic structures that may contain sp^3C-F and/or sp^3C-Si bonds, as illustrated by the exemplary species shown.

Table 1

Generic structure	Example of species	sp^3C-F	sp^3C-Si
$(R_3Si)_2O$	$(CH_3)_3SiOSi(CH_3)_3$	No	Yes
$[(R_f)_{3-x-y}R^1_xF_ySi]_2O$	$(CF_3)_3SiOSi(CF_3)_3$	Yes	Yes
$(R_f)_{4-a}SiR^1_a$	$(CF_3)_4Si$	Yes	Yes
$R^2_{4-b}SiF_b$	CH_3SiF_3	No	Yes
$(R_f)_{4-c-b}SiR^1_cF_b$	$(CF_3)_3SiF$	Yes	Yes
$(R_3SiO)_{4-b}SiR_b$	$(CH_3)_3SiOCH_3$	No	Yes
$(R^2O)_{4-c-b}SiR^2_bR^1_c$	$(CH_3-O)_2SiH(CH_3)_2$	No	Yes
$(H_3Si)_{4-a}CR^1_a$	$(H_3Si)_3CH$	No	Yes
$(R^2O)_{4-c-b}(H_3Si)_bCR^1_c$	$(CH_3O)_2CHSiH_3$	No	Yes
$(R^2O)_{4-x-y-z}R^2_z(H_3Si)_yCR^1_x$	$(CH_3O)_2(CH_3)CHSiH_3$	No	Yes

Therefore, because neither Aronowitz nor Lee disclose or suggest methods employing the chemical precursors recited in Claim 1, and because Lee teaches away from chemical precursors

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containing $\text{sp}^3\text{C-F}$ and $\text{sp}^3\text{C-Si}$ bonds, Applicant respectfully requests reconsideration and withdrawal of the Claims 1-27 and 32-50 under 35 U.S.C. § 103(a) as being unpatentable over Aronowitz or Lee.

Claim Rejections - Double Patenting

Claims 1-27 and 32-50 have been rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-40 of U.S. Patent No. 6,458,718. Applicant respectfully traverses this rejection. Applicant respectfully submits that the instant claims, as amended, recite numerous generic structures that are neither taught nor suggested by the claims of U.S. 6,458,718. Therefore, Applicant respectfully requests reconsideration and withdrawal of this rejection.

Conclusion

Applicant respectfully submits that the instant application is in condition for allowance, early notification of which would be appreciated. The Office is respectfully invited to contact the undersigned with any questions regarding this application.

This response is intended to be fully responsive to the aforementioned Office Action. However, if some matter or compliance with some requirement has been inadvertently omitted, Applicant respectfully requests a new time period for reply under 37 C.F.R. §1.134 to supply the omission. See M.P.E.P. §714.03.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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Dated: 11/3/03

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